

Interactive comment on “A microtopographic signature of life: Ecohydrologic feedbacks structure wetland microtopography” by J. S. Diamond et al.

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Diamond - Hydrology and Earth System Sciences. A microtopographic signature of life: Ecohydrologic feedbacks structure wetland microtopography

This paper is carefully prepared and presents some interesting features of the spatial arrangement of hummocks and hollows in black ash peatlands. I think that the laser techniques allowed a detailed mapping of microtopography that has probably not been done in such detail in other studies. I am, however, not convinced that this work shows ‘that the structure and regular patterning of wetland microtopography is an autogenic response to hydrology.’ On (L635-36). There are a variety of external influences such

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as frost/ice, severe disturbance in drought, floods, wind that could be influencing these wetlands. Some of the basic questions posed in this study seem rather simplistic and most folks who have worked in peatland systems would already know this. Indeed figures 5, 6 and 7 would be predicted by simple logic before collecting and analyzing such data. As a consequence, I rate the novelty of this work as rather low.

I suggest that the authors refocus their data on the detailed spatial arrangement of hummock and hollows and stay away from this autogenic feedback idea – because frankly, I am unconvinced from what is presented. I would have expected some more information on the types of vegetation on the tops and sides of hummocks vs the sides and bottoms of hollows.

L141 Prediction 1 that elevation distribution will be bimodal in a hummock hollow system seems to be a rather mundane prediction as you selected the study site with such characteristics.

L145 Prediction 2. This would only be relevant with shallow peat. There are plenty of studies that show that peatlands often spread across the landscape over thousands of years of peat accumulation so there is very little reason to think depth is that important, after a minimum depth of peat is achieved.

L153. It would be good to have a better understanding of the negative process that maintains a hollow part of the landscape. If there is not a powerful process that tears these substrates apart, what will maintain the hollows over the decades?

L181-190 I did not really understand the description of the hydrology of these sites. These are quite generic descriptions of these landforms. It would be nice to know more about the freeze-thaw cycle of the peat and how this might be a factor in hummock hollow distribution and the types of disturbances that might periodically affect these wetlands. What is the frequency of extreme flooding and drought in these systems? Could flooding be a primary reason for maintenance of patterns and hence be linked to wetness? What is the lateral flow of water through the peatlands and does this have

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any effect on the physical movement of the hummocks during times of extreme flood? Further, later in the paper there is a statement that hummocks are often associated with an ash stem. Perhaps this is an important mechanism that should have been explored in your spatial study.

L195-205 What is the density of trees? Canopy cover or leaf area index of the forest? I would like to know what sort of substrate this forest is growing on. Is it Sphagnum peat or Carex or feather moss? Paper like this needs some discussion of the mosses/herbs and graminoids that cover the ground surface in such places.

L319 Using a steel rod and resistance to pushing down - how was buried wood distinguished from mineral soil at the base of the peat? If wood was encountered, then averaging with 3 other nearby spots will produce an underestimate of the true depth. Incidentally, it is traditional to use a spoon-like end on such probes to bring up a bit of mineral soil to confirm that it has been reached.

L325-30 You did not really tell us where the well was positioned relative to hummock hollow system. What was the control height to which you were defining the water level? I could not figure this out from the datum description.

339 What is the elevation of the well and what is ground surface (mineral soil or top of hummock)?

L141 The hydroperiod is based upon 1 year (I think?). Given the dynamics of moisture from one year to the next, is this long enough? Also was this a typical year. I expect that very wet years might influence the dynamics of these stems for years after.

Fig. 5. Please remind us what the O elevation means.

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